

CLAIMS

We claim:

1. A template for bone milling, comprising:
 - 2 a frame having a top, a bottom, one or more external sidewalls, and one or more internal sidewalls, said frame having one or more openings extending there through from said top to said bottom wherein at least one of said one or more internal side walls defines a peripheral boundary of each of said one or more openings;
 - 6 a guide track formed in said one or more internal sidewalls, said guide track receiving a guide of a bone milling device whereby said bone milling device may be moved about said peripheral boundary using said guide track.
- 1 2. The template of claim 1 further comprising a means for removably securing said frame to a bone which is to be milled.
- 1 3. The template of claim 2 wherein said means for removably securing includes one or 2 more tabs projecting from said frame which have one or more securing points which may be 3 secured to a bone.
- 1 4. The template of claim 3 wherein said one or more tabs project from said one or more 2 external sidewalls.
- 1 5. The template of claim 1 wherein said guide track is positioned approximately midway 2 between said top and said bottom of said frame.
- 1 6. The template of claim 1 wherein said guide track has a flat lower surface which is 2 approximately parallel to said top and said bottom of said frame.
- 1 7. The template of claim 1 wherein said guide track has an angled upper surface which 2 projects at an angle from said lower surface to a point relatively closer to said top of said 3 frame than said bottom of said frame.

- 1 8. The template of claim 1 wherein said guide track has an arcuate upper surface which
2 extends from said lower surface to a point relatively closer to said top of said frame than
3 said bottom of said frame.
- 1 9. The template of claim 1 wherein guide track has an arcuate lower surface and an angled
2 upper surface which projects at an angle from said lower surface to a point relatively closer
3 to said top of said frame than said bottom of said frame.
- 1 10. The template of claim 1 wherein said frame is curved to match one or more curves of a
2 bone.
- 1 11. The template of claim 10 wherein said frame has a peripheral boundary in a shape
2 configured to accommodate a femoral implant.
- 1 12. The template of claim 1 wherein said frame has a peripheral boundary in a shape
2 configured to accommodate a tibial implant.
- 1 13. The template of claim 1 wherein said peripheral boundary has one or more bulbous
2 regions.
- 1 14. A kit for partial knee replacement surgery; comprising:
2 a plurality of tibial frames, each of said tibial frames having a top, a bottom, an
3 external sidewall, and an internal sidewall, each of said tibial frames having an opening
4 extending therethrough from said top to said bottom of said tibial frame wherein said
5 internal side wall defines a peripheral boundary of said opening, each of said plurality of
6 tibial frames having an opening sized to match one of said plurality of tibial implants;
7 a guide track formed in said internal sidewall of each of said tibial frames, said
8 guide track receiving a guide of a bone milling device whereby said bone milling device
9 may be moved about said peripheral boundary using said guide track.

- 1 15. The kit of claim 14, further comprising at least one femoral frame having a top, a
2 bottom, an external sidewall, and an internal sidewall, said at least one femoral frame
3 having an opening extending therethrough from said top to said bottom of said femoral
4 frame wherein said internal side wall defines a peripheral boundary of said opening wherein
5 said opening is sized to match said at least one femoral implant.
- 1 16. The kit of claim 15 wherein said tibial frames are constructed from metal.
- 1 17. The kit of claim 14 wherein said tibial frames are constructed from plastic.
- 1 18. The kit of claim 14 wherein said tibial frames are constructed from ceramics.
- 1 19. The kit of claim 15 wherein said femoral frames is constructed from metal.
- 1 20. The kit of claim 15 wherein said femoral frame is constructed from plastic.
- 1 21. The kit of claim 15 wherein said femoral frame is constructed from ceramic.
- 1 22. The kit of claim 14 further comprising means for removably securing each of said tibial
2 frames to a tibia bone.
- 1 23. The kit of claim 22 wherein said means for removably securing includes one or more
2 tabs projecting from said tibial frame which have one or more securing points which may
3 be secured to a tibia bone.
- 1 24. The kit of claim 23 wherein said one or more tabs project from said external side wall
2 of said tibia frame.
- 1 25. The kit of claim 15 further comprising means for removably securing said at least one
2 femoral frame to a femur bone.

1 26. The kit of claim 14 wherein said guide track in each of said tibial frames is positioned
2 approximately midway between said top and said bottom of said tibial frame.

1 27. The kit of claim 14 wherein said guide track in each of said tibial frames has a flat
2 lower surface which is approximately parallel to said top and said bottom of said tibial
3 frame.

1 28. The kit of claim 14 wherein said guide track in each of said tibial frames has an angled
2 upper surface which projects at an angle from said lower surface to a point relatively closer
3 to said top of said frame than said bottom of said tibial frame.

1 29. The kit of claim 14 wherein said guide track in each of said tibial frames has an arcuate
2 upper surface which extends from said lower surface to a point relatively closer to said top
3 of said tibial frame than said bottom of said tibial frame.

1 30. The kit of claim 14 wherein guide track in each of said tibial frames has an arcuate
2 lower surface and an angled upper surface which projects at an angle from said lower
3 surface to a point relatively closer to said top of said tibial frame than said bottom of said
4 tibial frame.

1 31. The kit of claim 14 wherein said peripheral boundary of at least one of said plurality of
2 tibial frames has one or more bulbous regions

1 32. The kit of claim 15 further comprising a guide track formed in said internal sidewall of
2 said at least one femoral frame, said guide track receiving a guide of a bone milling device
3 whereby said bone milling device may be moved about said peripheral boundary using said
4 guide track.

1 33. The kit of claim 32 wherein said guide track in said at least one femoral frame is
2 positioned approximately midway between said top and said bottom of said femoral frame.

1 34. The kit of claim 32 wherein said guide track in said at least one femoral has a flat lower
2 surface which is approximately parallel to said top and said bottom of said femoral frame.

1 35. The kit of claim 32 wherein said guide track in said at least one femoral frame has an
2 angled upper surface which projects at an angle from said lower surface to a point relatively
3 closer to said top of said femoral frame than said bottom of said femoral frame.

1 36. The kit of claim 32 wherein said guide track in said at least one femoral frame has an
2 arcuate upper surface which extends from said lower surface to a point relatively closer to
3 said top of said femoral frame than said bottom of said femoral frame.

1 37. The kit of claim 32 wherein guide track in said at least one femoral frame has an
2 arcuate lower surface and an angled upper surface which projects at an angle from said
3 lower surface to a point relatively closer to said top of said femoral frame than said bottom
4 of said femoral frame.

1 38. The kit of claim 14 further comprising a bone milling device.

1 39. The kit of claim 38 wherein said bone milling device is a one time use disposable.

1 40. The kit of claim 38 wherein said bone milling device has a milling bit which is angled
2 from a drive member.

1 41. The kit of claim 40 wherein said milling bit is angled at approximately 90 degrees from
2 said drive member.

1 42. The kit of claim 38 wherein said bone milling device includes a peripheral flange
2 which serves as said guide.

- 1 43. A kit for orthopedic surgery; comprising:
- 2 a plurality of implants;
- 3 a plurality of frames, each of said frames having a top, a bottom, an external
- 4 sidewall, and an internal sidewall, each of said frames having an opening extending
- 5 therethrough from said top to said bottom of said frame wherein said internal side wall
- 6 defines a peripheral boundary of said opening, each of said plurality of frames having an
- 7 opening sized to match one of said plurality of tibial implants; and
- 8 a guide track formed in said internal sidewall of each of said frames, said guide
- 9 track receiving a guide of a bone milling device whereby said bone milling device may be
- 10 moved about said peripheral boundary using said guide track.
- 1 44. The kit of claim 43 wherein said frames are constructed from metal.
- 1 45. The kit of claim 43 wherein said frames are constructed from plastic.
- 1 46. The kit of claim 43 wherein said frames are constructed from ceramics.
- 1 47. The kit of claim 43 further comprising means for removably securing each of said
- 2 frames to a bone.
- 1 48. The kit of claim 47 wherein said means for removably securing includes one or more
- 2 tabs projecting from said tibial frame which have one or more securing points which may
- 3 be secured to a bone.
- 1 49. The kit of claim 48 wherein said one or more tabs project from said external side wall
- 2 of said frame.
- 1 50. The kit of claim 43 wherein said guide track in each of said frames is positioned
- 2 approximately midway between said top and said bottom of said frame.

- 1 51. The kit of claim 43 wherein said guide track in each of said frames has a flat lower
2 surface which is approximately parallel to said top and said bottom of said frame.
- 1 52. The kit of claim 43 wherein said guide track in each of said frames has an angled upper
2 surface which projects at an angle from said lower surface to a point relatively closer to said
3 top of said frame than said bottom of said frame.
- 1 53. The kit of claim 43 wherein said guide track in each of said frames has an arcuate upper
2 surface which extends from said lower surface to a point relatively closer to said top of said
3 frame than said bottom of said frame.
- 1 54. The kit of claim 43 wherein guide track in each of said frames has an arcuate lower
2 surface and an angled upper surface which projects at an angle from said lower surface to a
3 point relatively closer to said top of said frame than said bottom of said frame.
- 1 55. The kit of claim 43 wherein said peripheral boundary of at least one of said plurality of
2 frames has one or more bulbous regions.
- 1 56. The kit of claim 43 further comprising a bone milling device.
- 1 57. The kit of claim 56 wherein said bone milling device is a one time use disposable.
- 1 58. The kit of claim 56 wherein said bone milling device has a milling bit which is angled
2 from a drive member.
- 1 59. The kit of claim 58 wherein said milling bit is angled at approximately 90 degrees from
2 said drive member.
- 1 60. The kit of claim 56 wherein said bone milling device includes a peripheral flange
2 which serves as said guide.

1 61. A bone milling method, comprising the steps of:
2 affixing to a joint region of a bone a template having
3 (i) a frame having a top, a bottom, one or more external sidewalls, and one
4 or more internal sidewalls, said frame having one or more openings extending therethrough
5 from said top to said bottom wherein at least one of said one or more internal side walls
6 defines peripheral boundary of each of said one or more openings, and
7 (ii) a guide track formed in said one or more internal sidewalls; and
8 milling a portion of said joint region of said bone using a bone milling device
9 having a guide which is received in said guide track by moving said bone milling device
10 about said peripheral boundary using said guide track to guide said bone milling device.

1 62. The method of claim 61 wherein said milling step leaves a central plateau in said joint
2 region which is removed by said bone milling device without using said template.

1 63. The method of claim 61 further comprising the step of controlling a depth of milling by
2 said bone milling device.

1 64. The method of claim 63 wherein said step of controlling is achieved by selecting a
2 thickness of said frame affixed to said bone in said affixing step.

1 65. The method of claim 63 wherein said step of controlling is achieved by selecting a
2 position of said guide track in said frame affixed to said bone in said affixing step.

1 66. The method of claim 63 wherein said step of controlling is achieved by selecting a size
2 of a burr used in said milling step.

1 67. A template for bone milling, comprising:
2 a frame having a top, a bottom, one or more external sidewalls, and one or more
3 internal sidewalls, said frame having one or more openings extending there through from
4 said top to said bottom wherein at least one of said one or more internal side walls defines a
5 peripheral boundary of each of said one or more openings; and

6 a pre-bent fastening means for removably securing said frame to a posterior surface
7 of a bone which is to be milled.

1 68. The template of claim 67, wherein said pre-bent fastening means is at least one pre-bent
2 tab.

1 69. The template of claim 67, wherein said pre-bent fastening means is at least one pre-bent
2 hook.

1 70. The template of claim 67 further comprising a means for removably securing said
2 frame to an anterior surface of a bone which is to be milled.

1 71. The template of claim 70 wherein said means for removably securing includes one or
2 more tabs projecting from said frame which have one or more securing points which may be
3 secured to a bone.

1 72. The template of claim 71 wherein said one or more tabs project from said one or more
2 external sidewalls.

1 73. The template of claim 67 wherein said frame is curved to match one or more curves of
2 a bone.

1 74. The template of claim 67 wherein said frame has a peripheral boundary in a shape
2 configured to accommodate a femoral implant.

1 75. The template of claim 67 wherein said frame has a peripheral boundary in a shape
2 configured to accommodate a tibial implant.

1 76. The template of claim 67 wherein said peripheral boundary has one or more bulbous
2 regions.

1 77. The template of claim 67 wherein said template further comprises
2 a guide track formed in said one or more internal sidewalls, said guide track
3 receiving a guide of a bone milling device whereby said bone milling device may be moved
4 about said peripheral boundary using said guide track.

1 78. A bone milling method, comprising the steps of:
2 affixing to a joint region of a bone a template having
3 (i) a frame having a top, a bottom, one or more external sidewalls, and one
4 or more internal sidewalls, said frame having one or more openings extending therethrough
5 from said top to said bottom wherein at least one of said one or more internal side walls
6 defines peripheral boundary of each of said one or more openings, and
7 (ii) a pre-bent fastening means for removably securing said frame to a
8 posterior surface of a bone which is to be milled; and
9 milling a portion of said joint region of said bone using a bone milling device.

1 79. The bone milling method of claim 78, wherein said bone milling device has a flange
2 with a flat surface that rests on said top of said frame, said bone milling device moving
3 about said peripheral boundary using said internal sidewall to guide said bone milling
4 device.

1 80. The bone milling method of claim 78, wherein said frame further comprises
2 a guide track formed in said one or more internal sidewalls, said guide track
3 receiving a guide of a bone milling device whereby said bone milling device may be moved
4 about said peripheral boundary using said guide track.

1 81. The method of claim 78, wherein said fastening means is at least one pre-bent tab.

1 82. The method of claim 78, wherein said fastening means is at least one pre-bent hook.

1 83. The method of claim 78 further comprising the step of controlling a depth of milling by
2 said bone milling device.

- 1 84. The method of claim 83 wherein said step of controlling is achieved by selecting a
2 thickness of said frame affixed to said bone in said affixing step.
- 1 85. The method of claim 83 wherein said step of controlling is achieved by selecting a size
2 of a burr used in said milling step.
- 1 86. A bone milling kit, comprising:
2 a plurality of implants; and
3 a plurality of frames, each of said frames having a top, a bottom, an external
4 sidewall, and an internal sidewall, each of said frames having an opening extending
5 therethrough from said top to said bottom of said frame wherein said internal side wall
6 defines a peripheral boundary of said opening, each of said plurality of frames having an
7 opening sized to match one of said plurality of tibial implants, each frame comprising a pre-
8 sent fastening means for removably securing said frame to a non-exposed surface of a bone
9 which is to be milled.
- 1 87. The kit of claim 86 wherein said frames are constructed from a material selected from
2 the group consisting of metal, plastic, and ceramics.
- 1 88. The kit of claim 86 further comprising means for removably securing each of said
2 frames to an exposed surface of a bone.
- 1 89. The kit of claim 88 wherein said means for removably securing includes one or more
2 bendable tabs projecting from said frame which have one or more securing points which
3 may be secured to an exposed surface of a bone.
- 1 90. The kit of claim 89 wherein said one or more bendable tabs project from said external
2 side wall of said frame.
- 1 91. The kit of claim 86 wherein said peripheral boundary of at least one of said plurality of
2 frames has one or more bulbous regions.

- 1 92. The kit of claim 86 further comprising a bone milling device.
- 1 93. The kit of claim 92 wherein said bone milling device includes a cutting means with a
2 peripheral flange with a bottom surface which rests on said top of said frame during
3 milling, thereby controlling the depth of cutting of said cutting means.
- 1 94. The kit of claim 92 wherein said bone milling device is a one time use disposable.
- 1 95. The kit of claim 92 wherein said bone milling device has a milling bit which is angled
2 from a drive member.
- 1 96. The kit of claim 95 wherein said milling bit is angled at approximately 90 degrees from
2 said drive member.
- 1 97. The kit of claim 86 wherein said implants are tibial implants and said frames are tibial
2 frames.
- 1 98. The kit of claim 86 wherein said implants are femoral implants and said frames are
2 femoral frames.
- 1 99. A bone milling kit, comprising,
2 at least one frame having a top, a bottom, an external sidewall, and an internal
3 sidewall, said at least one frame having an opening extending therethrough from said top to
4 said bottom of said frame wherein said internal side wall defines a peripheral boundary of
5 said opening; and
6 a milling device with a cutting means and a flange, a bottom surface of said flange
7 riding on said top of said frame and a side surface of said flange abutting against said frame
8 during milling, thereby controlling the depth of cutting by said cutting means.
- 1 100. The kit of claim 99 further comprising one or more means for removably securing said
2 frame to a bone which is to be milled.

1 101. The kit of claim 100 wherein said one or more means for removably securing said
2 frame to a bone is a pre-bent fastening means for removably securing said frame to an un-
3 exposed surface of a bone which is to be milled.

1 102. The kit of claim 100 wherein said one or more means for removably securing includes
2 one or more bendable tabs projecting from said frame which have one or more securing
3 points which may be secured to an exposed surface of a bone.

1 103. The kit of claim 100 wherein said at least one frame is a tibial frame.

1 104. The kit of claim 100 wherein at least one frame is a femoral frame.

1 105. A bone milling device, comprising
2 a drive member;
3 a cutting means; and
4 a radial support means, wherein said radial support means projects along an outer
5 circumference of said cutting means, and wherein said cutting means projects beyond said
6 radial support means by a distance equal to a depth of a cut made by said cutting means.

1 106. The bone milling device of claim 105, wherein said radial support means partially
2 circumscribes said cutting means.

1 107. The bone milling device of claim 105 wherein said radial support means fully
2 circumscribes said cutting means.

1 108. A method of milling a bone, comprising the steps of
2 contacting a surface of said bone with a bone milling device comprising
3 a drive member,
4 a cutting means, and
5 a radial support means, wherein said radial support means projects along an
6 outer circumference of said cutting means, and wherein said cutting means projects

7 beyond said radial support means by a distance equal to a depth of a cut made by
8 said cutting means; and
9 milling a portion of said bone by guiding said bone milling device along said surface
10 of said bone.

1 109. A bone milling kit, comprising
2 a femoral bone milling device, comprising
3 a drive member,
4 a cutting means, and
5 a radial support means, wherein said radial support means projects along an
6 outer circumference of said cutting means, and wherein said cutting means projects
7 beyond said radial support means by a distance equal to a depth of a cut made by
8 said cutting means; and
9 at least one femoral implant.

1 110. The bone milling kit of claim 109, further comprising
2 at least one tibial implant, at least one tibial template, and a milling device for use
3 with said tibial template.

1 111. A bone milling apparatus, comprising
2 i) a cutting device comprising
3 a drive member,
4 a cutting means, and,
5 a chucking mechanism connecting said drive member to said cutting means;
6 and
7 ii) a frame having a top surface and a bottom surface, said frame having a slot
8 extending there through from said top surface to said bottom surface, and at least one
9 support means disposed on said bottom surface;
10 wherein said chucking means extends through said slot, and wherein a bottom
11 surface of said cutting means projects beyond said support means by a distance equal to a
12 depth of a cut made by said cutting means.

1 112. The bone milling apparatus of claim 111, further comprising a latching mechanism to
2 reversibly fix said cutting device at a position along said slot.

1 113. A method of milling a bone, comprising the steps of
2 contacting a surface of said bone with a bone milling apparatus, comprising
3 i) a cutting device comprising
4 a drive member,
5 a cutting means, and,
6 a chucking mechanism connecting said drive member to said cutting means;
7 and
8 ii) a frame having a top surface and a bottom surface, said frame having a slot
9 extending there through from said top surface to said bottom surface, and at least one
10 support means disposed on said bottom surface;
11 wherein said chucking means extends through said slot, and wherein a bottom
12 surface of said cutting means projects beyond said support means by a distance equal to a
13 depth of a cut made by said cutting means; and
14 milling a portion of said bone surface by guiding said bone milling apparatus over
15 said surface of said bone.

1 114. The method of claim 113, wherein said bone milling apparatus further comprises a
2 latching mechanism to reversibly fix said cutting device at a position along said slot.

1 115. A bone milling kit, comprising,
2 a bone milling apparatus, comprising
3 i) a cutting device comprising
4 a drive member,
5 a cutting means, and,
6 a chucking mechanism connecting said drive member to said cutting means;
7 and
8 ii) a frame having a top surface and a bottom surface, said frame having a slot
9 extending there through from said top surface to said bottom surface, and at least one

10 support means disposed on said bottom surface;
11 wherein said chucking means extends through said slot, and wherein a bottom
12 surface of said cutting means projects beyond said support means by a distance equal to a
13 depth of a cut made by said cutting means; and
14 iii) an implant.

1 116. The bone milling kit of claim 115 further comprising at least one tibial implant, at least
2 one tibial template, and a milling device for use with said tibial template.

1 117. The bone milling kit of claim 115, wherein said bone milling apparatus further
2 comprises a latching mechanism to reversibly fix said cutting device at a position along said
3 slot.

1 118. The kit of claim 14 further comprising a plurality of tibial implants and at least one
2 femoral implant.

1 119. The kit of claim 15 wherein said femoral frame is curved to match at least one curve
2 of a femur bone.

1 120. The bone milling kit of claim 99 further comprising at least one implant.

1 121. The bone milling kit of claim 99, wherein said at least one frame is a plurality of
2 frames.